VARKENSBEDRIJF NEIMEIJER: EXPERIENCE IN DEVELOPING AN AGROFORESTRY SYSTEM FOR PIGS

Neimeijer N[1], Neimeijer J[1], San Giorgi X[2], Dawson A[2*], Kleijer G[3], Cremer H[4]

(1) Varkenshouderij Neimeijer, Heino, The Netherlands (2) Food Forestry Development, Utrecht, The Netherlands (3) Veterinary adviser, Utrecht, The Netherlands (4) Biomühle + Kräuterfutter GmbH, Kleve, Germany

*Corresponding author: info@FoodForestry-Development.nl

Abstract

Varkensbedrijf Neimeijer is an organic pig farm with a vision of local, regenerative and resilient food production. They are developing an agroforestry system for their pigs with the goal of producing healthy meat in a natural and economically feasible way, with a strong connection with the local people. The study explores how to achieve this and considers questions concerning: pig health, breed, meat quality, suitable agroforestry system, species choice and management. A literature review, expert consultation, design sessions and on farm trials were used to answer these questions. This highlighted the opportunities and challenges in developing this new system and the likely impacts that different choices would have on the farm. This resulted in a diverse multistory silvopastoral system being chosen to supplement the pigs diet with fruits, nuts, herbs and fodder leaves. The farm is in the early stages of implementation and further results are expected in the future.

Keywords: pig farm; agroforestry; animal health; medicinal herbs; organic; design

Introduction

Varkensbedrijf Neimeijer is the pig farm of Nieske and Jeroen Neimeijer. Since taking over the farm in 2012 they have been pursuing their vision of local, regenerative and resilient food production. Their first step was the transition to organic, but they wanted to go beyond this; to produce healthy meat in a natural and economically feasible way, with a strong connection with the local people. They saw agroforestry as their opportunity to achieve this.

In 2016 they brought together a team, made up of agroforestry designers, a veterinaire, and a feed expert and together they began to turn their vision into reality. The key questions at the beginning of the project were:

1. How can we support pig health?
2. Does this impact the quality and nutritional value of the meat?
3. What is the most suitable agroforestry system for the pigs?
4. What are the most suitable species for the system?
5. How to manage the pigs within this system?
6. What is the impact of an agroforestry system on the farms environmental impact?

Materials and methods

Theory of change – was used to help map out how activities and interventions will lead to the desired change. It is a method used for the planning and evaluation of change. The approach is

to define the long-term goals and assess if the necessary preconditions can be achieved that lead to the goal. The method helps to show the distinction between desired change and what will actually be achieved.

Literature review and expert knowledge – A review of practical and scientific literature, in addition to the expert knowledge of the team members provided the basis for making informed decisions.

Experimentation – Many of the interventions are novel, or have little prior documentation, so the effects, interactions and optimization have yet to be fully explored. Thus, explorative trials are used to test some of the interventions.

Design – The knowledge gained through the consultation, literature review and experiments is used in the design of the overall agroforestry system for the farm.

Results

Health was one of the key factors in the farm development. We explored three main aspects that influence pig health: environment, breed and feed. In changing the environment, warmth, shelter and freedom from parasites were important considerations. For the pig breed, the intrinsic characteristics of the breed, or hybrid, were important. Different breeds have different qualities, for health, outdoor hardiness, litter size, mothering ability, foraging ability and so forth. Some breeds we considered for their characteristics were: Duroc, Saddleback, Berkshire, Large Black and Gloucestershire Old Spot. In our system we sought to find the balance between a breed good for outdoor production and one that satisfies the desired meat quality characteristics. Much of the available information on rare pig breeds were anecdotal, as scientific literature was limited, consequently this will be a stepwise breeding process. Finally, feed was explored. As we predicted, the feed a pig consumes has a large impact on its: health, growth rate, carcass composition, meat flavor and meat nutritional composition (Frankic et al. 2009; Cho et al. 2012; Rossi et al. 2013). Lack of certain nutrients leads to nutrient deficiencies, which may lead to an increased incidence of diseases, sickness and death. Conversely, many studies show that medicinal herbs, such as oregano, can be used to support pig health. Different medicinal herbs are known to have different effects, and have been used effectively to: reduce diarrhea, reduce infections, and support the digestive system. In standard use, dry herbs are added to feed, however, we have also explored the opportunity to use fresh herbs. Research shows that when the environment allows, animals carry out their own health promoting behaviors (Morris and Keilty 2006). Thus, part of the ongoing development is to explore if the animals will self-medicate. Interestingly, we also found literature that supported the idea that when pigs are fed a healthier diet they can produce meat that is healthier for the consumers. Thus, providing support for: healthy feed, healthy pigs, healthy meat. Current, research doesn't show changes to the meat quality characteristics due to herbal supplementation, but that oxidative status and sensory attributes can be improved (Rossi et al. 2013).

Of the different types of agroforestry possible silvopasture offered the greatest opportunity to meet the different needs of the farm. Of particular importance were: the integration of herbs with tree crops, providing a suitable environment for the pigs and creating a manageable system. The silvopasture system permits a high diversity of species and allows a medicinal pasture to be grown amongst seasonal fruit and nut trees. Species choices were determined predominantly by the suitability for the location, health value for the pigs and production capacity. By exploring different combinations of pasture and tree crops we obtained an insight into the crops contribution to the pigs' diet in general. This led to the initial sketch design of the farm seen in Figure 1. Here the large grass fields are divided into smaller plots surrounded by trees, creating smaller fields where rotational grazing can be performed.

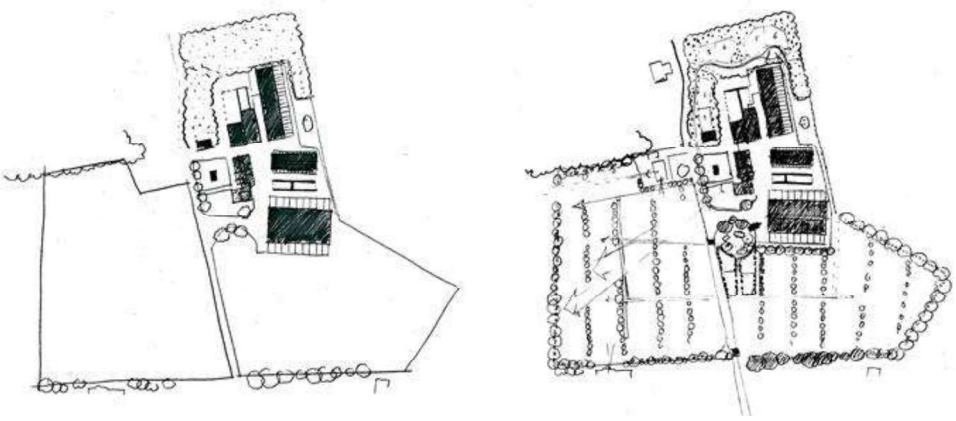

Figure 1: Left, the original farm with surrounding pastures. Right, the concept sketch of the farm as a silvopasture pig farm.

Management of the different elements is a key challenge. As seen in Figure 2 the pigs can be quite destructive to the pasture. Through developing new pasture mixtures, rotational management and breeding for grazing behavior, it is expected that a more permanent pasture can be achieved. Thus, improving forage production and supporting soil health. If a permanent pasture can be achieved, with rows of trees, then additional environmental benefits are also expected to be achieved, such as improved: carbon sequestration, rainwater infiltration and biodiversity. However, these aspects have yet to be studied in detail.

Figure 2: The common impact of pigs on pasture, the boundary between the grass and the bare soil is where the electric fence was placed.

Discussion

The development of the farm towards a silvopasture system for pigs shows promise to achieve the initial vision. The effect of different feed and genetics is already having an impact on pig health and this is expected to increase as the system becomes more established. Further monitoring will be necessary to assess the final impacts on both pig health and the nutritional quality of the meat. An additional study is also being carried out to access the impact on the ecosystem, and an assessment of the economic pros and cons of the system is planned in the future. The study has provided valuable information to support and oppose different decisions during the design of the farm. During the farms' ongoing development additional experiments will continue to aid in the optimization of the final silvopasture system.

References

Cho JH, Zhang S, Kim IH (2012) Effects of anti-diarrhoeal herbs on growth performance, nutrient digestibility, and meat quality in pigs. Asian Austral J Anim 25: 1595.

Frankic T, Voljč M, Salobir J, Rezar V (2009) Use of herbs and spices and their extracts in animal nutrition. Acta Agric Slov 94: 95-102.

MorrisT, Keilty M (2008) Alternative health practices for livestock. John Wiley and Sons.

Rossi R, Pastorelli G, Cannata S, Tavaniello S, Maiorano G, Corino C (2013) Effect of long term dietary supplementation with plant extract on carcass characteristics meat quality and oxidative stability in pork. Meat Sci 95: 542-548.